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Pesticide Fact Sheet Number 94
2,4- Dichlorophenoxy

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

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EPA

Pesticide Fact Sheet

Name of Chemical: 2,4-D
Reason for Issuance:
Date Issued: July 1986
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1. DESCRIPTION OF CHEMICAL

Generic Name: (2,4- Dichlorophenoxy) acetic acid

Common name: 2,4-D (includes parent acid as well as the 35 derivatives (esters and salts))

EPA Shaughnessy code: 030001

Chemical Abstracts Service (CAS) number: 94-75-7

Year of Initial Registration: 1948

Pesticide type: Herbicide, plant growth regulator

Chemical family: chlorinated phenoxys

2. USE PATTERNS AND FORMULATIONS

2,4-D is a systemic herbicide widely used to control broadleaf weeds. There are approximately 1500 registered products containing 2,4-D active ingredient. Over 60 million pounds of 2,4-D active ingredients are annually applied domestically with the majority used for control of broadleaf weeds in wheat, field corn, grain sorghum, sugar cane, rice, barley, and range and pastureland.

USE PATTERNS

Agricultural: wheat, field corn, grain sorghum, sugar cane, rice, barley, soybeans, orchard crops.

Aquatic Management: water hyacinth control; Tennessee Valley Authority (TVA) Eurasian watermilfoil; lakes, ponds where treated water is not used for domestic or irrigation purposes.

Pasture and Rangeland: brush control

Home and Garden: lawns, ornamental, turf, parks, recreation areas.

Forest Management: brush control, conifer release, tree injection.

TYPES AND METHODS OF APPLICATION: aerial and ground equipment, knapsack sprayers, pressure and hose-end applicators, and lawn spreaders.

TYPES OF FORMULATIONS: granular, amine and ester liquids, dust, aerosol spray (foam).

TOLERANCES:

Tolerances are established for residues of 2,4-D acid in a variety of raw agricultural commodities, meat, milk, eggs, poultry, fish and shellfish. The tolerances include residues of 2,4-D as a result of the application of the 2,4-D acid as well as the salts and esters. (These tolerances are listed in 40 CFR 180.142).

Food additive tolerances have been established for sugarcane molasses, milled fractions from barley, oats, rye, and wheat, and potable water as a result of the use of 2,4-D in specific aquatic management programs.

3. AGENCY REVIEW

The Agency initiated a review of the information available on 2,4-D in 1980 in order to address questions concerning potential health effects associated with the use of 2,4-D. This review was conducted to determine if 2,4-D should be reviewed under the Special Review process or if another regulatory action was appropriate. After a review of the existing toxicology data supporting 2,4-D registrations, the EPA concluded that the available information did not indicate that the continued use of 2,4-D posed a significant health hazard when used in accordance with label directions and precautions. The Agency did conclude, however, that more information on 2,4-D toxicological properties was necessary to better assess the potential health hazards associated with the use of 2,4-D.

On August 29, 1980, after consulting with the Scientific Advisory Panel (SAP), the Agency issued a data call-in letter under authority of Section 3(C)(2)(B) of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) to registrants of 2,4-D. The letter required submission of data on the following potential health effects: acute toxicity (oral and dermal), oncogenicity (tumor formation) in rat and mouse, reproduction, teratogenicity (birth defects), neurotoxicity, and metabolism.

Major registrants of technical 2,4-D products subject to the data requirements have formed the "Industry Task Force on 2,4-D Research Data" (Task Force) to jointly produce the required data.

The following data have been submitted by the Task Force to support the 2,4-D registrations:

- Acute Oral and Dermal Toxicity Studies (Rabbit, Rat) for all manufacturing use products
- Teratology Studies (Rat) for 2,4-D acid and 2,4-D Dichlorophenol
- Reproduction Study (Rat) for 2,4-D acid
- Pharmacokinetic (Metabolism) Study (Rat, Mouse) for 2,4-D acid and isooctyl ester of 2,4-D
- Neurotoxicity Study (Rat) for 2,4-D acid
- Combined Chronic Toxicity and Oncogenicity Study (Rat) for 2,4-D.

The only remaining outstanding study is the oncogenicity study in mice which is scheduled to be submitted in June 1987. A 52-week interim report has been submitted to the Agency and is currently under review. The results of the major studies submitted thus far are summarized below.

Teratology Study (Rat) 2,4-D acid

Fischer 344 female rats were administered doses of 2,4-D acid (technical grade) suspended in corn oil by gavage (oral intubation) of 8, 25 or 75 mg/kg on days 6-15 of gestation (35 rats/dose group). The results of the study were:

Maternal toxicity No Observed Effect Level (NOEL) = 75 mg/kg/day
Maternal toxicity Lowest Effect Level (LEL) = not found, since NOEL was at the highest dose tested.
Fetotoxic NOEL = 25 mg/kg/day
Fetotoxic LEL = 75 mg/kg/day

The study does not indicate a teratogenic (birth defects) effect up to 75 mg/kg/day.

Teratology Study (Rat) 2,4-Dichlorophenol (ester)

Fischer 344 female rats were gavaged on days 6-15 of gestation with 0, 200, 375, or 750 mg/kg of 2,4-Dichlorophenol suspended in corn oil at 4 ml/kg. The results of the study were:

Maternal toxicity LEL = 200 mg/kg
Fetotoxic NOEL = 375 mg/kg
Fetotoxic LEL = 750 mg/kg (delayed ossification of bones)

The test material was not teratogenic under the conditions of the study.

Reproduction Study (Rat) 2,4-D acid

Fischer 344 rats were administered 5, 20, or 80 mg/kg/day of 2,4-D acid in the diet. The results indicate:

Maternal toxicity NOEL = 5 mg/kg/day
Maternal toxicity LEL = 20 mg/kg/day
Fetotoxic NOEL = 5 mg/kg/day
Fetotoxic LEL = 20 mg/kg/day

The results indicated that at the lowest dose tested of 5.0 mg/kg/day neither parent nor offspring were affected by the administration of the chemical. However, at the next higher dose tested (20 mg/kg/day) there was a decrease in maternal body weight and a reduced pup weight (weight of offspring).

There were no effects seen on fertility in male or female rats.

Neurotoxicity (Rat) Dimethylamine salt of 2,4-D

Four groups of male and female Fischer CDF 344 rats (15 rats/group) were used in a study to determine whether repeated dermal exposure to 2,4-dimethylamine on the peripheral nervous system of rats would result in pharmacological and/or toxicological effects. The skin of the animals in the three treatment groups was painted with a 12% 2,4-D amine solution for 2 hrs/day 5 days per week for 3 weeks. Control animals were treated with tap water.

Dermal exposure to 2,4-D resulted in two systemic effects: treated rats weighed less than controls and the kidneys of treated rats weighed more than the controls. Even though the rats had clear systemic effects of exposure to 2,4-D there were no treatment-related changes in the function or structure of the nervous system.

Oncogenicity (Rat)

Male and female rats (strain-CDF(F344)/CRL-BR)) were administered doses of 1, 5, 15, and 45 mg/kg/day of 2,4-D acid in the diet. The results of the study indicate that the administration of 2,4-D appears to produce increased numbers of astrocytomas in brains of male rats at 45 mg/kg/day and is suggestive of a carcinogenic effect. The Agency is currently reviewing the study and will make a final determination on the significance of the study in the Fall of 1986.

4. Summary of Major Data Gaps:

Oncogenicity Study (Mouse) due June 1987

Environmental fate, residue chemistry, product chemistry, and ecological effects data gaps to be identified as part of the Registration Standard review due to be issued in early 1988.

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